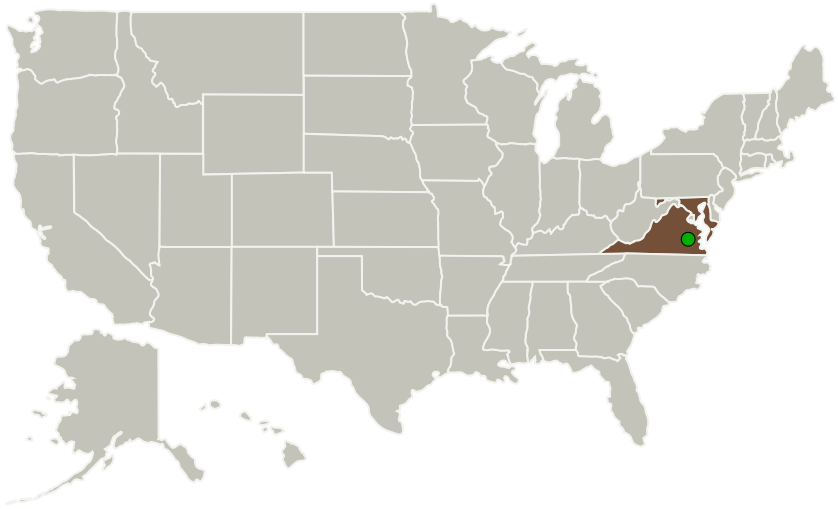
Lidar Wind Profiler for the NextGen Airportal, Phase II

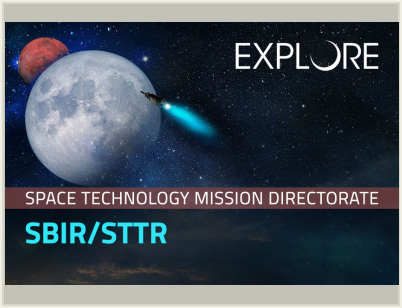
Completed Technology Project (2011 - 2014)

Project Introduction

The development of a standoff sensor that can measure 3D components of wind velocity in the vicinity of an airport has the potential to improve airport throughput, safety and efficiency. The goal of this research is to develop a Lidar Wind Profiler (LWP) that uses multiple near-parallel lidar beams to track the motion of atmospheric aerosol structures and extract multi-component wind data. In Phase I, the measurement requirements were analyzed and used to develop a numerical model of the performance of a prototype system. In addition, an eye safety analysis was conducted and a conceptual design of the LWP prototype was developed. Studies were conducted with a breadboard in order to demonstrate improvements in spatial and temporal resolution of the system and to obtain more data to further refine the system requirement and algorithm. In Phase II, the LWP design will be finalized and a high power laser design will be combined with narrow pulse-width generation technology as well as an Optical Parametric Oscillator in order to generate a wavelength of 1550. The algorithm will be optimized and extended to measurements in all three dimensions using a multi-beam lidar system. Techniques to extract atmospheric turbulence and detect aircraft wake vortices will be developed. A software package will be developed that will include the following: a front-end GUI for displaying the data and for interfacing with the operator; a real-time data-processing module; a data acquisition module; a data storage and retrieval module. At the end of Phase II, the LWP prototype will be field tested and evaluated using validation data from ultrasonic anemometers.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Masstech, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB), Minority-Owned Business	Columbia, Maryland
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Maryland	Virginia

Project Transitions

June 2011: Project Start

April 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139029)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Masstech, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

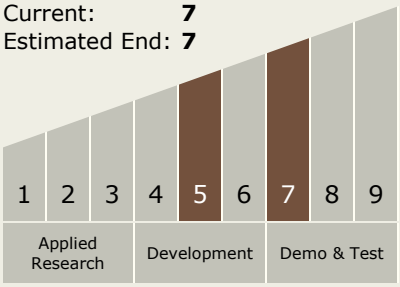
Carlos Torrez

Principal Investigator:

Anand Radhakrishnan

Technology Maturity (TRL)

Start: **5**
Current: **7**
Estimated End: **7**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System